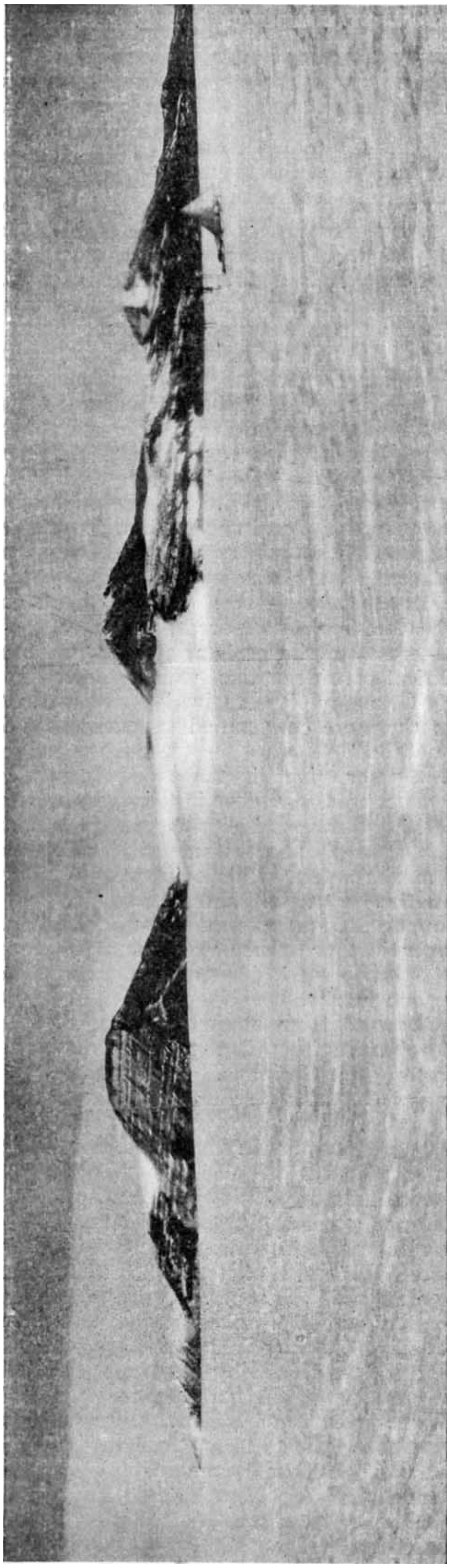

Fig. 2.—Buckley Island from the Beardmore Glacier. From "Antarctic Fossil Plants," by A. C. Seward, F.R.S.

As regards the age of the plant-bearing beds the possibilities range from the Permo-Carboniferous to the Rhaetic; the former is regarded as the more probable.

A considerable section of the paper is devoted to "General Considerations suggested by the occurrence of Glossopteris in Antarctica" (pp. 25-39). The uniformity of the Devono-Carboniferous flora throughout the world is contrasted with the appearance of more or less distinct Northern and Southern Floras in Permo-Carboniferous times. In the northern region there is no evidence of seasonal changes or of glacial conditions, while in the south glaciation was widely prevalent, and the fossil trees show annual rings in their wood. In fact, as the author points out, the Glossopteris Flora is generally associated with glacial deposits. The interesting suggestion is made that Glossopteris may have been a gregarious and deciduous plant.

The prevalence of glacial conditions in the southern hemisphere at that period adds to the difficulty of understanding how a highly organised vegetation could have flourished so near the Pole as Lat. 85°. No explanation, unfortunately, can be given; the author contents himself with the cautious statement: "That there has been a considerable change of climate is certain, but the palæobotanical data cannot be regarded as evidence favourable to an alteration in the position of the earth's axis." (p. 41).

Prof. Seward regards the Antarctic discoveries as supporting the late Dr. Blanford's view that the Glossopteris Flora may have been first differentiated on the great Antarctic continent, towards the close of the Carboniferous epoch (p. 42).

The concluding words of the memoir command our sympathy: "The heroic efforts of the Polar party were not in vain. They have laid a solid foundation; their success raises hope for the future, and will stimulate their successors to provide material for the superstructure."

D. H. S.

FUTURE COMPETITION WITH GERMANY.

The current issue of the *Bulletin d'Encouragement pour l'Industrie nationale* (May–June, 1915, No. 3, vol. 122) is of special interest, inasmuch as it gives the views of men, each eminent in his own particular sphere, on the reasons why much of French trade has been captured by Germans; and also their suggestions for preventing the commercial aggression of the Germans after the war. The bulletin begins with a short preface by the president, M. Léon Lindet; this is followed by suggestions by M. Niclousse to the following effect: (i) A statute is to be passed for stopping foreign, and especially German, individuals, companies, or products from masquerading as French. It is urged that all machines, apparatus, and products should be of French manufacture and, if possible, invented by a Frenchman. (ii) A circular to be issued by the Syndicate of Mechanicians, Boiler-makers, and Foundrymen, urging the public to avoid purchasing anything of German or Austro-Hungarian manufacture, and to buy rather from the Allies. (iii) To prevent Frenchmen from acting as agents for the enemy. (iv) To employ no German means of transport.

Much of the French material was made in districts now occupied by Germany; it is sad to read that 95 per cent. of the steel made by the Gilchrist-Thomas process, 90 per cent. of the iron ore, 100 per cent. of steel tubes, 76·6 per cent. of rails, etc., formerly made in France, are now in German hands. On the other hand, iron alloys, cast-iron, spiegel-iron, iron coated with zinc, copper, and lead, have been little affected.

It is also hoped that duties will no longer be levied on raw materials; French manufacture has hitherto been handicapped by this.

The Syndicate of Pharmacy also suggests that French medical men be circularised, and that lists be furnished them of substances of German origin which should not be purchased. The Society of Lithographers, in its report, states that lithographic stones, previously obtained from Munich, may be replaced by plates of zinc and aluminium with advantage. Bronze leaves, and bronze, copper, and aluminium powders, it appears, have not been made in France; it is recommended that their manufacture be begun. The German success has been largely due to long credits; they sell machines, and by their banking system can afford to wait long for payment. Subsidised German transport gives German manufacturers a great advantage; it is often cheaper for a Frenchman to send his goods through Hamburg than directly from one part of France to another. A better French consular system is called for, as well as the revival of apprenticeship, and the more loyal co-operation of workmen.

Portland cement has not been troubled with German competition in France; but the machines are of German make. It appears that 80 per cent. of the cement works are in territory at present occupied by the German army.

Agricultural implements, though made to some extent in France, have largely been imported from the United States. It is suggested in this report that lending corporations, trusting for repayment to the honour of the borrowers, would be of great service, and that they would rarely have loans out to defaulters.

Such are the reports on various industries. They all reprobate German methods as unfair, while giving credit to the Germans for great industry and power of organisation.

A long article follows by Prof. Henri Hauser, of Dijon, on "German Industry as a Factor in War." He attributes to the Germans the good qualities of regular, methodical work, and a sense of, or even a genius for, organisation. "It is the union of the laboratory and the factory which has created German wealth." "It is also to be remarked that there is a close link between the director's office and the library of the economist, the geographer, and the historian." "The German chemist and the German commercial traveller walk side by side to conquer the world." These and other similar aphorisms explain the astonishingly rapid growth of German industry.

Nothing is more erroneous than to describe Germany as an over-peopled country. Of the 67 million Germans, 17 millions are tillers of the soil; but every year peasants throng into the towns; there are above 45 towns of more than 100,000 inhabitants. Cereals and meat have to be imported to feed 20 million Germans. Cotton is the largest import; its value is about 500 million marks, or 25 million pounds sterling. Germany requires much capital; new companies and ventures are continually being started; and owing to the system of credit, it may be said that she swallows capital before its birth. Companies with an imposing capital rest on the credit of industrial banks; these on Central banks; these again on the Deutsche Bank, which is guaranteed by the Reichsbank, that is, the credit of the whole German State. In order to pay for her imports, foreign trade is essential to Germany; she must sell her manufactured products. *This war is being waged to keep and to gain foreign commerce.* Konrad Hönisch, the Social-Democrat, said: "It is the social interests of the proletariat, even more than any political considerations, which render the victory of Germany imperative." The Industrial State is therefore condemned to participate in a "Welt-politik."

Prof. Hauser gives instances of "dumping"; *e.g.*, in 1900, iron wire cost in Germany 25 marks per 100 kilograms, and elsewhere 14 marks; in 1902, the Coke Syndicate forced the consumer to pay 15 marks a ton, while coke was sold abroad for 11 marks. But the gain exceeds the loss; the State-supported syndicate makes this possible. In the former instance there was a loss on foreign trade of 859,000 marks, but a gain on home trade of 1,117,000 marks.

The Germans form companies abroad, largely from foreign capital; but the majority of the directorate are Germans. For example, the *Banque des Chemins de Fer orientaux* of Zürich has a board of eight German directors, one Austrian, five Swiss, one French, and one Belgian. The ordinary shares are all held by Germans; the preference shares, with a lower rate of interest, by the foreign subscribers, for the low rate of interest does not tempt German investors. In Italy a similar state of things exists. All large concerns, such as the Nord Deutscher Lloyd, the Hamburg-Amerika line, the Deutsche Bank, the Disconto-Gesellschaft, Siemens-Schuckert, Krupp, and Guison are subventioned by the Imperial Ministry of Foreign Affairs; furthermore they are helped by *a kind of industrial espionage,* as well as by guarantees and subsidies. "Germany was 'in a blue funk' about her commerce. What would become of Essen, of Gelsenkirchen, of all Westphalia, if the Roumanians, Greeks, and Serbs were to order their cannon, rails, or locomotives from Glasgow or Creusot? War appeared preferable to

Germany than a huge commercial crash, and the iron hand replaced the velvet glove." "Little by little the idea of a necessary war—a war almost to be wished for—became the desire of the working classes; failing it, they might starve, and their employers, the capitalists, be ruined." "After the great war is over the commercial war will be on us again. We must prepare *now.*"

To this essay there follow some interesting articles by M. Delloye, by M. Ernest Fourneau, director of the Laboratory of Therapeutic Chemistry at the Pasteur Institute, M. Justin Dupont, Prof. Wahl of Nancy, M. Legouëz, and M. Ribes-Christophle. Among other observations we note one stating that French manufacturers usually only keep pace with current demand for goods; when a period of prosperity sets in, he cannot supply the increased demand, and his customers are driven to buy German goods; for Germans have always reserve plant ready for an emergency. For this reason they are able to execute orders more quickly; what it takes three months to supply in France can be delivered from Germany in a fortnight. M. Fourneau gives much interesting information on German drug manufacture; he concludes: "You know that fraud and slimness pass in Germany for quasi-virtues. . . . Germany, after having tried to frighten its adversary by its terrifying appearance, knows well how to appear humble, insignificant, and invisible." M. Dupont directs attention to the enormous task before the Allies of overtaking the German colour manufacture, which has been elaborated during the past forty years. Drugs, dyes, and explosives are so interlaced that the by-products of one manufacture often serve as the raw material of the others. M. Ribes-Christophle treats of German commerce in Argentina. False labels for goods, and adulteration are common. German firms, too, supported by their banks, *i.e.*, by the Central Government, sell at first at a loss, until they have killed out competitors. Their banks, of which there are branches in Argentina, act as company-promoters.

The impression gained from these articles is that German trade is largely fraudulent, sometimes honest, always methodical; that it is regarded as the duty of the State to support it by all means, moral and immoral; and that France must take steps to exclude it if she is to retain her position as a manufacturing nation. What these steps are has not yet been indicated. We shall look forward with the utmost interest to their decision; but it should be one taken in concert with the Allies.

William Ramsay.

PROF. PAUL EHRLICH.

ONLY recently we lost Löffler, one of the pioneers of modern bacteriology, and now Paul Ehrlich has passed away. He died on August 20, as all good workers might wish to die—suddenly in his laboratory, in full harness, and before the rust of age had dimmed his powers.

Born in 1854 at Strehlen, in Silesia, of Jewish parents, he was one of the many distinguished Hebrews who have contributed to make Germany's fame what it is in the world of science and art. He was educated at the Gymnasium at Breslau, and afterwards at the Universities of Breslau and Strasburg, where he graduated in medicine. From the outset of his career he took the deepest interest in the chemical relationships of living matter and in the affinities of various reagents for living cells. One of his earliest researches was upon the effects of certain aniline colours upon living tissues, and he devoted much attention to staining methods, devising new stains, and Ehrlich's hæmatoxylin and Ehrlich's triacid stain are stock solutions in the present-day biological laboratory. An investigation on staining methods for the tubercle bacillus led to the discovery that certain dyes possessed a peculiar affinity for this bacillus, and this fact tinged his whole philosophy, and suggested the conception of the specific affinity of certain chemical groups for particular cells and tissues.

He carried out pioneer work in hæmatology, differentiating and classifying the various forms of leucocytes or white blood-corpuscles.

His bent now turned largely on chemical lines. Diphtheria antitoxin had been discovered by Roux and Behring, but discrepancies in its standardisation came to light, and Ehrlich set himself to elucidate the cause of these discrepancies. As an outcome of this work a method of standardisation was evolved which exists to this day, and the strength of diphtheria antitoxin is now practically always described in Ehrlich "units." This work led on to an investigation of the mode of genesis of antitoxin, and the publication of the now famed "side-chain theory" of the formation of anti-bodies in general.

Ehrlich also performed some notable researches on cancer, and developed the atreptic theory of certain forms of immunity, but this investigation was dropped before long, probably because he foresaw that it was unlikely to bear fruit.

He now returned to some of his earlier work on the specific affinity of dyes and other substances for certain cells and micro-organisms, particularly the protozoan parasites. In trypan red he found a substance which attacked certain species of trypanosomes and cured the infection caused by them, but he failed to find a substance which would cure the allied trypanosomiasis in man. Besides dyes, a large number of complex organic compounds of arsenic and mercury were prepared and tested by himself and his assistants, and resulted in the discovery of "606," or salvarsan, as a cure for syphilis.

These are some of his achievements. Not only have his discoveries already benefited mankind in the direct alleviation of human suffering, but his researches into the perplexing phenomena of immunity and chemo-therapy have opened the way for further discoveries in these directions. He must be regarded as a pioneer who has carved the first track through that dense forest of the Unknown, which the worker of the future, following